

What is claimed is:

1            1. A sensor including:  
2                (1) a resistive element having a top surface electrode and a bottom  
3                surface electrode;  
4                (2) a sensing element for sensing energy from outside and generating  
5                an electrical signal;  
6                (3) a field effect transistor element in which a gate electrode is  
7                formed on the rear surface of the chip; and  
8                (4) a substrate having a first electrode, a second electrode, and a third  
9                electrode on the top surface of said substrate;  
10              wherein  
11              the bottom surface electrode of said resistive element is electrically  
12              connected with the first electrode of said substrate;  
13              the gate electrode of said field effect transistor element is electrically  
14              connected to a portion of the top surface electrode of said resistive element in such  
15              a way that the gate electrode and a portion of the top surface electrode of said  
16              resistive element coincides;  
17              one of the electrodes of said sensor element is electrically connected  
18              with a portion of the top surface electrode of said resistive element;  
19              a source electrode and a drain electrode of said field effect transistor  
20              element are respectively electrically connected with the second electrode and the  
21              third electrode on said substrate; and  
22              the other electrode of said sensing element is electrically connected  
23              with the first electrode on said substrate.

1           2. The sensor of claim 1 wherein said resistive element is formed with  
2       one of a ceramic material, glass material, and ferrite material.

1           3. The sensor of claim 1 wherein the top surface electrode and the  
2       bottom surface electrode of said resistive element contain at lease one of chromium,  
3       tin, and indium.

1           4. A method of manufacturing a sensor, said sensor including:  
2              (1) a resistive element having a top surface electrode and a bottom  
3       surface electrode;  
4              (2) a sensing element for sensing energy from outside and generating  
5       an electrical signal;  
6              (3) a field effect transistor element on which a gate electrode is  
7       formed on the rear surface of the chip; and  
8              (4) a substrate having a first electrode, a second electrode, and a third  
9       electrode on the top surface of said substrate;  
10          said method comprising the steps of:  
11          electrically connecting the bottom surface electrode of said resistive  
12       element with the first electrode of said substrate;  
13          electrically connecting the gate electrode of said field effect transistor  
14       element to a portion of the top surface electrode of said resistive element in such a  
15       way that the gate electrode and a portion of the top surface electrode of said  
16       resistive element coincides;

17                   electrically connecting one of the electrodes of said sensing element  
18       with a portion of the top surface electrode of said resistive element;  
19                   electrically connecting a source electrode and a drain electrode of said  
20       field effect transistor element with the second electrode and the third electrode on  
21       said substrate, respectively; and  
22                   electrically connecting the other electrode of said sensing element  
23       with the first electrode on said substrate.

1               5. The method of manufacturing a sensor of claim 4 wherein the  
2     method of manufacturing said resistive element comprises the steps of:  
3               forming an electrode over the entire top and bottom surfaces of a  
4     large-area flat resistor body in advance;  
5               measuring its resistance value; and  
6               cutting to predetermined dimensions based on the measured  
7     resistance value to obtain a predetermined resistance value.

1                   6. The method of manufacturing a resistive element of claim 5  
2 wherein said resistor body is formed by sintering at a temperature at which the  
3 water absorption rate becomes 1% or below.

1                   7. The method of manufacturing a sensor of claim 4 wherein the step  
2       of electrically connecting the bottom surface electrode of said resistive element  
3       with the first electrode of said substrate further comprising:  
4                   obtaining a predetermined resistance value by electrically connecting  
5       the bottom surface electrode of said resistive element with the first electrode of said

6 substrate by using a conductive material and controlling the amount of the  
7 conductive material, thereby controlling the amount of resin that rises on the sides  
8 of said resistive element.

1           8. The method of manufacturing a sensor of claim 4, further  
2 comprising the step of:

3           obtaining a predetermined resistance value by controlling the  
4 resistance value and forming a resistive element having a predetermined value by  
5 performing at least one of heat treatment in a vacuum, heat treatment in a reducing  
6 gas atmosphere, and heat treatment in an inactive gas atmosphere, after forming the  
7 top surface electrode and the bottom surface electrode of said resistive element.

1           9. The method of manufacturing a sensor of claim 8, further  
2 comprising the step of:

3           performing heat treatment in the atmosphere or in an oxygen  
4 atmosphere after performing heat treatment in one of a vacuum, a reducing gas  
5 atmosphere, and an inactive gas atmosphere.